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The impact of smiling cues on social cooperation

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Abstract

While there is a plethora of experimental studies on the effects of preplay communication on economic behavior, little is known about the impact of simple cues, such as smiling, on pro-sociality. This article presents a comprehensive analysis exploring how the presence of a smiling opportunity affects pro-social behavior as measured by a one-shot linear public goods game. Our design varies (i) whether smiling is costly or costless and (ii) whether one or both members in a group are given the opportunity to smile. To test for the robustness of our results, we consider two versions of smiling cues: (i) a smiling label and (ii) a smiling face (emoji). Our findings indicate that introducing a cost for smiling has detrimental behavioral consequences regardless of the cue. Specifically, when smiling is costly, only a small minority of subjects are willing to smile as opposed to when smiling is costless. As a result, subjects contribute significantly less. These results remain the same regardless of the type of smiling cue that subjects can send. Overall, our findings provide new evidence that simple cues such as smiles embody information that influences pro-social behavior in social interactions.

KEYWORDS
contributions, public goods experiments, smiling

JEL CLASSIFICATION
C92; D07; H41

1 | INTRODUCTION

Communication is an integral part of our everyday lives. It can take different forms (such as verbal, visual, or nonverbal exchange of information) affecting our economic interactions and cooperative relationships. By now, it is well-documented that preplay communication can be used to achieve more socially desirable outcomes when personal gains and social benefits are at odds (see Sally, 1995 and Balliet, 2009 for meta-analyses).[1] However, the main focus of the literature is on the role of face-to-face and verbal communication. Numerous experimental studies have found that such forms of communication can align individual incentives to social ones (see Isaac and Walker, 1988; Brosig *et al.*, 2003; Bochet *et al.*, 2006; Bochet and Putterman, 2009; Oprea *et al.*, 2014; Feltovich and Grossman, 2015; and Palfrey *et al.*, 2017).[2] In parallel, a meta-analysis by Sally (1995) finds that the only variable that accounts for differences in cooperation and free-riding behavior is face-to-face communication.

While the effects of verbal communication on pro-social behavior have attracted considerable attention in the relevant literature, nonverbal forms of communication have been studied less often.[3] This lack of empirical evidence is surprising given the broad range of naturally-occurring social environments, which are characterized by nonverbal communication. Typical real-life examples include facial expressions, handshakes, clapping, and gestures, which involve eye contact, winks, or gaze. Our study focuses on the effects of smiling on cooperation as measured by observing behavior in a one-shot linear public good game.

Smiling frequently occurs in social interactions between humans and plays a significant role in our everyday transactions. For example, in many naturally occurring situations smiles may serve as nonverbal surrogates used in order to enhance the exchange of social information. In these situations, smiling is typically associated with positive connotations, which can act as a cooperation device and lead to more socially efficient outcomes. As a result, the display of a smile may operate as a mechanism that gives individuals the opportunity to signal their intentions for subsequent behavior. A more specific motivation for analyzing the effects of smiling on economic behavior stems from existing psychological literature, which suggests that the display of positive emotions through smiling can serve as a signal of positive experience (e.g., Ekman and Friesen, 1982; Frank and Ekman, 1993). These studies show that smiles (as transmitted via the use of emojis) correlate with generating positive feelings (e.g., Hess *et al.*, 1995).[4] Overall, these

[1]A different line of research has also recognized the positive impact of communication in overcoming coordination failures (e.g., Cason *et al.*, 2012; Charness, 2000; Crawford, 1998; Duffy and Feltovich, 2002, 2006).

[2]However, recent evidence suggests that the pro-cooperative effect of communication may be mitigated by the use of a limited message space (e.g., Charness and Dufwenberg, 2006; Cooper & Kühn 2016).

[3]By contrast, the effects of non-verbal communication have attracted relatively more attention in psychology research (see DePaulo & Friedman, 1997 and Riggio & Feldman, 2005 for overviews).

[4]There is a separate line of research showing that positive (negative) feelings are associated with economic behavior (e.g., Cubitt *et al.*, 2011; Joffily *et al.*, 2014).

findings suggest that smiles affect the way in which people behave positively. Our study provides a comprehensive analysis of how smiling interacts with pro-social behavior by considering two types of smiling cues: (i) a smiling (emoji) face and (ii) a smiling label. The rationale for considering a smiling face is that it reflects modern digital communication commonly employed in naturally occurring environments. On the other hand, we also consider a smiling label, which allows us to study nonverbal communication, free from confounding factors that are likely to interact with the use of smiling faces. Our design thus provides a tight test of the extent to which smiling can affect pro-social behavior in a mixed motive environment.

To analyze pro-social behavior, we turn to the analysis of a standard social dilemma game where members of a group share the benefits of a common resource but each has to decide individually how much to contribute to its provision. Contribution is costly to the contributor but helps all other group members.[5] Prior to playing the game, our subjects are given the opportunity to report their current state by selecting one of two options labeled as "smiling state" or "ready state." For a given type of smiling cue, we vary whether smiling is costless or costly. Additionally, we examine whether allowing one or both members in a group to utilize smiling labels affects behavior. Previous studies have shown that one-way communication leads to more frequent choices of the Pareto-dominant equilibrium in simple coordination games (e.g., Cooper *et al.*, 1992) and higher contributions in social dilemma games (e.g., Koukoumelis *et al.*, 2012). Yet, how one-way versus two-way communication utilizing smiling cues that are distinct from face-to-face/verbal communication influences behavior in a social dilemma game remains unclear.

Our findings indicate that smiling cues embody information that affects aspects of pro-social behavior. In particular, we find that introducing a cost for the use of smiling labels has detrimental effects on cooperative behavior in the sense that individuals become significantly less pro-social compared to the case when sending a smiling cue is free. This finding holds regardless of which smiling type we consider. Our results are driven by the fact that the frequency of smiling labels is significantly lower when such labels are costly compared to when they are costless. Our findings indicate that individuals attach significant negative informational value when smiling cues are available but not used.

Our results broaden the existing literature on communication in public good games. Specifically, we provide evidence using a large sample ($n = 454$) that costless smiling cues do not increase cooperation in a public good game with low cooperation benefits compared to when such communication is not possible. From a more practical perspective, one reason why costless smiling cues are equally effective compared to when such communication is not present is that subjects may perceive them as being an ambiguous and less explicit means of communication. Our results are also suggestive that, at least in one-shot interactions, less explicit forms of communication (as nonverbal is relative to face-to-face) may need to be accompanied with more explicit elements of communication (such as face-to-face interactions) which have been shown to foster pro-sociality (e.g., Bochet *et al.*, 2006; Bochet and Putterman, 2009). Experimental evidence (for a review, see Wang and Houser, 2019) shows that the presence of natural language communication has a positive impact on efficiency in various economic games. Relying on this evidence, it may be the case that, in our context, the limiting effects of smiling on pro-social behavior are due to the lack of a richer communication environment (e.g., allowing subjects to send free-form messages) which typically facilitates cooperation. Additionally, it might be the case that the benefits from cooperation in our setting are

[5]This paradigm has been typically employed in experimental economics to understand pro-social behavior (e.g., Andreoni, 1988; Brandts & Schram, 2001; Coats *et al.*, 2009; Ostrom & Vollan, 2010).

low and this may be a factor for the lack of significant differences between the costless and the no-communication treatments. Yet, when a cost of smiling is introduced, subjects refrain from using them and, importantly, we also observe that average contribution levels are lower. Future research is warranted to explore how smiling cues work in a mixed motive environment where the benefits from cooperation are higher.

Our article is organized as follows. Section 2 outlines the experimental design and procedures. Our experimental findings are presented in Section 3 and Section 4 concludes.

2 | EXPERIMENTAL DESIGN AND PROCEDURES

2.1 | Experimental design

Our experiment employs a between subject design, considering nine treatments. The main framework we employ is that of a standard two-player linear public goods game. In particular, subjects play a one-stage game where they randomly form groups of two members. Each group member is endowed with 20 tokens and has to decide how many of them to keep and how many to contribute to the public good (described as a "project" to subjects). Each token kept increases the own monetary payoff by one experimental currency unit (ECU). Each token contributed to the public good increases the payoff of every group member by 0.6 ECUs. Our choice to implement a low multiplication factor is that we wanted to adopt a more conservative approach where the temptation from reaping the benefits from free-riding were relatively strong. This would offer a more stringent test for the role of smiling in promoting cooperative behavior. For a given group member, the payoff function from this game is given by the following equation.

$$\pi_i = 20 - g_i + 0.6 \cdot \left(g_i + g_j\right) \tag{1}$$

where g_i ($0 \leq g_i \leq 20$) denotes the number of tokens contributed to the public good by group member i. Conditional on each subject i being motivated to maximize Equation (1), the Nash equilibrium requires that each group member free-rides completely (i.e. contributes zero to the public good, $g_i = 0$).

To address our main research questions, subjects were given the opportunity to report a state before playing the game in all treatments (except for the baseline). In particular, subjects were provided with two options: either to report a "Ready" state or a "Smiling" state. We analyze behavior in the following treatments, which differ in relation to i) whether the smiling state is costless or costly, ii) whether one or both of the two members in a group were given the opportunity to report their state, and iii) whether subjects could report their state using a smiling label or a smiling face. In the costly treatments, subjects who reported the "Smiling" state had to pay 0.5 ECUs, whereas reporting the "Ready" state was always costless (regardless of the treatments). The reporting of states was done choosing buttons labeled "smiling" and "ready" that either showed emojis above them or not. Our baseline treatments had subjects participate in the standard linear public goods game as described above, without subjects being given the opportunity to report their state.

The introduction of a cost for the smiling label may increase the credibility of such cues and, as a result, may signal stronger willingness to cooperate compared to costless smiling cues, which may be perceived as being pure cheap talk. Alternatively, introducing a price for the smiling labels may act as a discouraging factor for individuals to use such labels, which may in turn have negative implications for cooperative behavior. It is therefore of interest to assess which of these two forces will dominate when it comes to actual decision making.

We refer to the resulting treatments in which subjects could report their state as follows: (a) "Costless—One way" whereby the smiling cue is costless and one of the two group members (randomly selected) reports his/her state, (b) "Costless—Two way" whereby the smiling cue is costless and both group members report their states, (c) "Costly—One way" whereby the smiling cue is costly and one of the two group members (randomly selected) reports his/her state, and (d) "Costly—Two way" whereby the smiling cue is costly and both group members report their states.

In the "Two way" treatments, where both group members are given the opportunity to report their state (either "Smiling" or "Ready"), reporting is done sequentially, with one group member being randomly selected to go first. The reported state is revealed to the second member, prior to their own report. The reason for adopting a sequential structure was to avoid frequent occurrences of mixed states being sent. Our decision to adopt a sequential design for reporting states was motivated by a study due to Manzini *et al.* (2009), who find that report of mixed states occurs more frequently in a simultaneous structure compared to a sequential one.

Figure 1 reproduces the subjects' interface from the "Two way" treatments showing how our reporting of states took place. The top panel shows the interface when a smiling label was used; whereas the bottom panel shows the interface when a smiling face (emoji) was used. Specifically, subjects were asked to indicate what their current state is by selecting one of the two buttons containing either the word "Smiling" or "Ready." Note that subjects had to make an actual choice and no default option was provided.

2.2 | Procedures

In total, 454 subjects participated in the experiment. Table 1 presents an overview of our treatments, along with a breakdown of the number of subjects who participated in each treatment separately.

All subjects were recruited at the University of Birmingham, using the ORSEE software (Greiner, 2015) and the experiment was computerized and programmed with the software z-Tree (Fischbacher, 2007). At the end of each session, subjects were privately paid according to their total amount of experimental currency units (ECUs), using an exchange rate of £0.40 per ECU. Average earnings (including a show-up fee of £2.50) were £10.91. Sessions lasted 60 min, on average. Before subjects played the game, they received the instructions reproduced in supporting information Appendix A. As we wanted to ensure that subjects understood the decision situation and the mechanics of payoff calculations, all participants answered several control questions. The experiment did not proceed until every subject had answered these questions correctly.

3 | RESULTS

In presenting our data analysis, we first discuss whether and if so, under which conditions subjects are willing to report a smiling state. Following this, we explore the impact of smiling states on pro-social behavior across our treatments.

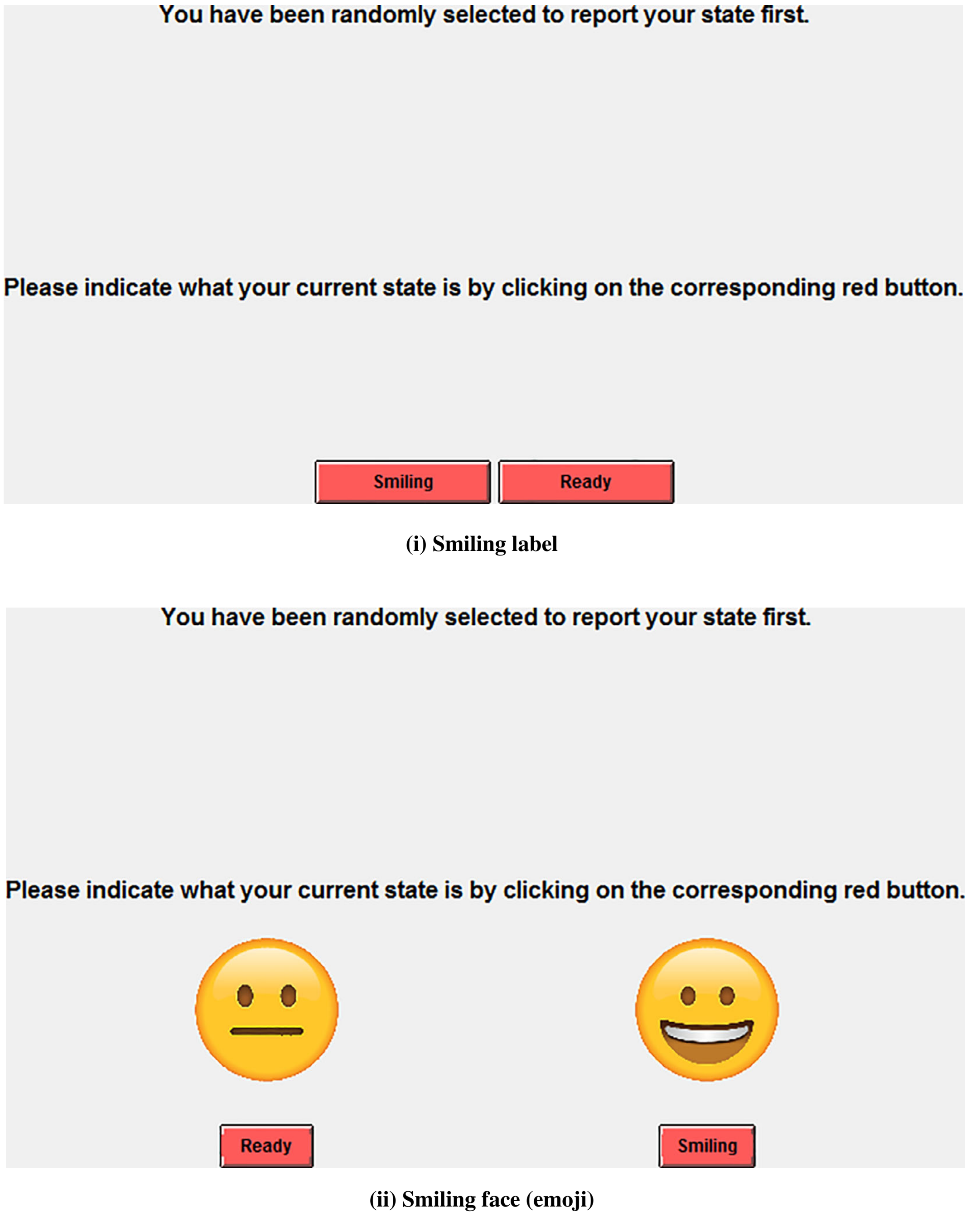

FIGURE 1 Subjects' interface in the "two way" treatments. (i) Smiling label. (ii) Smiling face (emoji) [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 1 Overview of the experimental design

Report of states	Treatments	Smiling label	Smiling face (emoji)
No	Baseline	46	
Costless	One way	50	50
	Two way	48	56
Costly	One way	54	54
	Two way	44	52

TABLE 2 Number of subjects reporting a smiling state across treatments

Report of states	Treatment	Smiling label	Smiling face (emojis)	
No	Baseline	—	—	
Costless	One way	0.76 (19/25)	0.80 (20/25)	*0.82 (126/154)*
	Two way	0.79 (38/48)	0.88 (49/56)	
Costly	One way	0.41 (11/27)	0.22 (6/27)	*0.31 (46/150)*
	Two way	0.25 (11/44)	0.35 (18/52)	
		0.55 (79/144)	*0.58 (93/160)*	

Note: The significance of italic value is Test of Equality of proportions, $z = 0.60$, $p = 0.549$.

3.1 | Frequency of smiling states

Result 1: *Subjects report a smiling state significantly more when smiling is costless compared to when it is costly. This is the case regardless of the type of smiling cue (either a smiling label or a smiling face).*

Support: Table 2 reports the number of subjects who decided to report a smiling state. As a first observation, we see that the type of smiling cue does not affect the decision of subjects for whether to report a smiling state or not. Overall, 79 out of 144 subjects (54.86%) reported a smiling state in the treatments with a smiling label and 93 out of 160 (58.13%) subjects reported a smiling state in the treatments with a smiling face.[6]

However, there is a remarkable difference in how often subjects report a smiling state depending on whether this is costly or not. In the costless treatments, we find that the overwhelming majority of subjects (i.e., 81.82%, 126/154) report a smiling signal (Test of equality of proportions, $z = 9.27$, $p < .001$). This pattern is reversed when reporting states become costly. Only a minority of subjects (i.e., 30.67%, 46/150) are prepared to pay and report a costly state.

Table 3 reports the frequencies of subjects who report a state for each possible signal constellation. Specifically, we include four categories: "ready-ready," "smile-smile," "ready-smile," and "smile-ready." In each of the four signal constellations, the first state refers to the first

[6]The specific test statistic is $Z = (p_1 - p_2)/S_{pc}$, where pi is the proportion of reported smiles in subsample i, and $S_{pc} = \{p_c(1 - p_c)[(1/N_1) + (1/N_2)]\}\hat{}0.5$. p_c is an estimate of the standard error of the difference in proportions, $p_1 - p_2$. p_c is an estimate of the population proportion under the null hypothesis of equal proportions, $p_c = (p_1N_1 + p_2N_2)/(N1 + N2)$, where N_i is the total number of interactions in subsample i (see Glasnapp & Poggio, 1985).

TABLE 3 Frequencies of each state constellation

		Smiling label				Smiling face (emojis)			
		Same state		Mixed state		Same state		Mixed state	
Report of states	**Treatments**	**"ready"**	**"smile"**	**"ready, smile"**	**"smile, ready"**	**"ready"**	**"smile"**	**"ready, smile"**	**"smile, ready"**
No	Baseline	—	—	—	—	—	—	—	—
Costless	One way	6/25	19/25	—	—	5/25	20/25	—	—
	Two way	1/24	15/24	5/24 (20.83%)	3/24 (12.5%)	1/28	22/28	5/28 (17.86%)	0/28 (0%)
Costly	One way	16/27	11/27	—	—	21/27	6/27	—	—
	Two way	12/22	1/22	6/22 (27.27%)	3/22 (13.64%)	14/26	6/26	5/26 (19.23%)	1/26 (3.85%)

Note: Percentages are presented in parentheses. For the "One way" treatments, the same state constellation indicates that the randomly selected subject reported either a ready or a smiling state. In the "Mixed state" constellation, "ready, smile" ("smile, ready") indicates that the first mover sent a ready (smile) state, which was followed by a smile (ready) state for the second mover.

mover and the second state refers to the second mover. For the "One way" treatments we report the frequencies of the smiling and ready states of the randomly selected subject who was given the opportunity to report his/her state.

We first examine how frequently mixed versus nonmixed states were reported in the "Two-way" treatments. We observe that, both in the "Costless" and "Costly" treatments, most pairs report mixed states compared to nonmixed states. Specifically, in the treatments where a smiling label was allowed to be sent, 16 out of 24 pairs (66.67%) and 13 out of 22 pairs (59.09%) sent a nonmixed state in the "Costless" and the "Costly" treatments, respectively. We obtain a similar pattern when considering the treatments where a smiling face was allowed to be sent: 23 out of 28 pairs (82.14%) and 20 out of 26 pairs (76.92%) sent a nonmixed state in the "Costless" and the "Costly" treatments, respectively. This provides evidence that, while the occurrence of mixed states was not possible to be eliminated completely, our sequential structure of state reporting kept them at relatively lower frequencies.

Next, we look at the frequencies of state constellations: the general observation is that most pairs choose to report the same signals (that is, either "ready-ready" or "smile-smile"), but the content of the signals (i.e., either the "smiling" or the "ready" state) differs depending on whether the smiling state is costly or costless. This is the case for the "Two way" as well as the "One way" treatments. Specifically, regardless of the type of smiling cue, in the "Two way" treatments we observe that the frequency of the "ready-ready" pairs is much higher in the treatments where smiles are costly (12 out of 22 pairs and 14 out of 26 pairs in the "smiling label" and the "smiling face" treatments, respectively) compared to when smiles are costless (1 out of 24 pairs and 1 out of 28 pairs in the "smiling label" and the "smiling face" treatments, respectively). The opposite pattern is obtained for the frequency of the "smile-smile" pairs. Such a state constellation is observed in only 1 out of 22 pairs and 6 out of 26 pairs in the "smiling label" and the "smiling face" treatments, respectively, when smiling signals are costly. By contrast, in the treatments where smiling states are costless, a "smile-smile" constellation is observed in 15 out of 24 pairs and 22 out of 28 pairs in the "smiling label" and the "smiling face" treatments, respectively.

In the "One way" treatments, we also observe a similar trend: which signal to report depends on whether the smiling state is costly or costless but not on the type of smiling cue. For the "Costly" treatments, 16 out of 27 pairs and 21 out of 27 pairs in the "smiling label" and the "smiling face" treatments, respectively, choose to report a "ready" state. This is reversed in the treatments where the smiling state is costless. Most pairs, in these cases, report a "smile-smile" state: 19 out of 25 pairs and 20 out of 25 pairs in the "smiling label" and the "smiling face" treatments, respectively. Taken together, the main message from our analysis is that even small communication costs dramatically reduce message use, which is in line with recent experimental studies on communication (e.g., Blume *et al.*, 2017; Fehr, 2017).

In presenting the consequences of smiling cues on economic behavior across our treatments, we next concentrate on subjects' contribution behavior in the linear public good game.

3.2 | Contribution behavior

Result 2: *(a) When smiling is costless, average contributions are not significantly different compared to the baseline treatment. (b) When smiling is costless, average contributions are significantly lower compared to when smiling is costly.*

TABLE 4 Average contributions across treatments

Report of states	Treatments	Average contributions in the smiling label treatment	Average contributions in the smiling face treatment	*p*-values (smiling label vs. smiling face)[a]
No	Baseline	6.72 (5.24)		—
Costless	One way	5.66 (5.90)	5.84 (6.01)	.978
	Two way	6.81 (6.10)	5.34 (5.50)	.214
Costly	One way	4.50 (4.94)	4.26 (5.41)	.560
	Two way	4.55 (4.57)	5.42 (7.40)	.530

Note: Standard deviations in parentheses.
[a]Two-sided Wilcoxon rank-sum test.

These results hold regardless of the type of smiling cue (either a smiling label or a smiling face).

Support: Table 4 reports the average contributions in each treatment separately, when a smiling label or a smiling face is available. As indicated in the last column of Table 4, by performing a Wilcoxon rank-sum test, we find that there are no differences in contribution behavior when we compare behavior in a given treatment across the two different types of smiling cues ("smiling label" versus "smiling face").

By contrast, we find that, relative to the baseline treatment, subjects, on average, contribute similar amounts of tokens in the costless treatments either when a smiling label ("Baseline" vs. "Costless—Two way," $p = .843$, and "Baseline" vs. "Costless—One way," $p = .242$) or a smiling face is available ("Baseline" vs. "Costless—Two way," $p = .122$) and "Baseline" vs. "Costless—One way," $p = .254$).[7] Turning to the costly treatments, average contributions are significantly lower in both costly treatments irrespective of whether both group members or one of the two members in a group report their states. In particular, this is observed in the smiling label treatments ("Baseline" vs. "Costly—Two way," $p = .049$) and "Baseline" vs. "Costly—One way," $p = .024$) but also in the smiling face treatments ("Baseline" vs. "Costly—Two way," $p = .035$) and "Baseline" vs. "Costly—One way," $p = .008$).[8]

When we pool the "One way" and the "Two way" data for each, the "Costless" and the "Costly" treatments, we find that average contributions are significantly lower in the latter compared to the former treatments in the smiling label treatments (6.22 tokens in the "Costless" treatments vs. 4.52 in the "Costly" treatments; $p = .063$). Similarly, we also find that average contributions are significantly lower in the pooled "Costly" treatments compared to the pooled "Costless" treatments in the smiling face treatments (5.58 tokens in the "Costless" treatments vs. 4.83 in the "Costly" treatments; $p = .068$). Taken together, our data show that the presence of a cost in reporting the smiling state discourages subjects to use this option and, as a result, subjects become less pro-social relative to the baseline treatment as well as to the treatments where there is no cost in reporting a smiling state. Our findings are robust to the type of smiling cues that subjects can use (either a smiling label or a smiling face).

[7]The comparison of the costless treatments ("Costless—Two way" vs. "Costless—One way") yields no significant differences either when a smiling label ($p = .301$) or a smiling face is available ($p = .799$).
[8]The comparison of the costly treatments ("Costly—Two way" vs. "Costly—One way") yields no significant differences either when a smiling label ($p = .832$) or a smiling face is available ($p = .995$).

As our final step, we analyze the effectiveness of each signal separately across treatments. To do this, we look at average contributions in each possible state constellation. However, we note that in the costly (costless) treatments, the number of observations we have for the smiling (ready) state is particularly low and we therefore treat such analysis cautiously, only referring to eyeballing remarks (as performing nonparametric test would be meaningless given the low number of observations in the relevant cells). Table 5 reports the average contributions in each state constellation per treatment. Two observations stand out from our analysis in Table 5. First, looking at each state constellation per treatment, we find that when smiles are costless, average contributions are typically higher compared to when smiles are costly. This is also the case where subjects can send a smiling face rather than a more abstract smiling label. For instance, when smiling is expensive, those subjects who decide to send a costly smiling face contribute, on average, 8.25 and 5.33 in the "Two way" and the "One way" treatments, respectively. This suggests that expensive (even if it is nonbinding) talk, like our costly smiling face, is generally more effective.

Second, we find that when both signals are costless, the use of the costless smiles does not have positive effects on cooperation relative to the costless ready signals. Again, this is more apparent in the smiling face treatments. For example, both in the "Two way" and "One way" treatments, costless smiles yield lower contributions than costless ready signals ("Two way": 5.5 vs. 6; "One way": 5.68 vs. 6.5, respectively). Concerning the smiling labels, the picture is mixed: we observe that costless smiles yield lower contributions in the "One way" treatments but not in the "Two way" treatments. Overall, these remarks suggest that costless smiles may be used as a strategic device in an attempt to entice the other group member to contribute without necessarily meaning that the signaller would contribute. As a result of this mutual cheap talk, average contributions appear to be lower.

4 | DISCUSSION AND CONCLUSIONS

In this study, we explore the role simple cues, such as smiling, play as a mechanism that determines aspects of individuals' pro-social behavior. Our workhorse is a standard two-player linear public goods game, which captures many naturally occurring situations where a tension between personal benefits and social gains emerges. Our experiment analyses how smiling, as a form of nonverbal preplay communication, impacts cooperative behavior in a setting where benefits from cooperation are low. To study these issues, our design varies (i) whether smiling is costly or costless and (ii) whether one or both group members are given the opportunity to communicate abstractly. To test for the robustness of behavior, we employ two types of smiling cues: a smiling label and a smiling face (emojis).

Our findings indicate that the cost of smiling is a crucial factor that influences the extent of cooperative behavior. In particular, introducing a cost for smiles makes subjects less willing to use them as an information channel in order to signal their intentions about subsequent behavior. As a result, the lack of using smiles has negative consequences on pro-social behavior: subjects contribute significantly less when smiles are costly. The type of smiling cue makes no difference with regards to the frequency of smiles and subsequent cooperative behavior.

Our experiment is related to previous social dilemma studies on cheap-talk. For example, in Wilson and Sell (1997) and Bochet *et al.* (2006), subjects are asked to indicate a nonbinding number of how much they would like to contribute to the common resource (prior to playing a standard public good game). Palfrey and Rosenthal (1991) allowed subjects to make a costless

TABLE 5 Average contributions across treatments in each state constellation

		Smiling label				Smiling face (emojis)			
		Same state		Mixed state		Same state		Mixed state	
Report of states	**Treatments**	**"ready"**	**"smile"**	**"ready, smile"**	**"smile, ready"**	**"ready"**	**"smile"**	**"ready, smile"**	**"smile, ready"**
No	Baseline	—	—	—	—	—	—	—	—
Costless	One way	5.92 (2.60)	5.58 (4.07)	—	—	6.5 (3.02)	5.68 (4.18)	—	—
	Two way	7.5 (0)	8.13 (5.31)	4.4 (3.15)	4 (2.65)	6 (0)	5.5 (3.44)	4.5 (5.23)	n.a.
Costly	One way	4.44 (3.32)	4.59 (3.74)	—	—	3.95 (3.46)	5.33 (3.31)	—	—
	Two way	4.25 (2.42)	2.5 (0)	6.08 (3.63)	3.33 (3.82)	4.29 (5.09)	8.25 (8.12)	4.3 (3.98)	10 (0)

Note: For the "One way" treatments, the same state constellation indicates that the randomly selected subject reported either a ready or a smiling state.

single announcement on whether they intended to contribute or not in a step level public good game. A common finding from these studies is that subjects did not obtain more efficient outcomes in the presence of cheap talk preplay communication opportunities. Our experiment contributes to the cheap-talk communication literature by showing that the availability of costly labels that are ultimately not used can have detrimental behavioral consequences in a public good environment where cooperation benefits are low. The effectiveness of smiling cues is limited so that average contributions are similar compared to when no smiling cues are present. This implies that smiling cues are a minimal form of communication which do not harm when they are costless but are harmful when costly. Overall, our findings suggest that in order to enhance pro-sociality, smiling cues may be necessary to be accompanied with other elements of the decision making environment such as higher benefits from cooperation in order for them to be able to reduce the temptation from free-riding benefits and yield higher cooperation levels.

In line with previous findings that numerical cheap talk does not increase contributions (e.g., Bochet and Putterman, 2009), we find that "smiling cue" cheap talk yields similar cooperation levels as interactions in which no communication is allowed. Consonant with past experimental evidence (e.g., Wang and Houser, 2019 and references therein), our findings show that when preplay communication does not include natural language, its positive effects in improving efficiency of economic outcomes are limited. Interestingly, subjects seem to attach significant negative informational value to the absence of simple cues, such as smiles, when they are costly. Introducing a price for smiling discourages its use, which in turn triggers negative behavioral consequences in establishing less socially efficient outcomes.

Our study gives rise to a number of different future research avenues. First, examining the temporal stability and robustness over time of our findings is of great importance to gain a deeper understanding of how smiling interplays with pro-sociality when reputation gains are present. It would be interesting to evaluate whether subjects would be more willing to use costly smiles when the game is repeated as it might be that paying to smile may have greater benefits in the long-run (as found by Manzini *et al.*, 2009, for coordination games). Second, further research is warranted to investigate the robustness of our results when the benefits from cooperation are higher than in our public good setting. It might be the case that smiling works better as a communication device when individuals' benefits from mutual cooperation are greater. Finally, how simple cues, such as smiling, affects other aspects of pro-social behavior remains an open empirical question which will help establish further the behavioral mechanisms through which observed behavior is affected.

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